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Study On Clinical Pharmacists' Initiated Interventions In Geriatric Population.

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ABSTRACT

To identify the drug related problems in geriatric population. To recommend apt and possible resolutions for drug related problems observed. To analyze the outcomes made with clinical pharmacist intervention. A prospective interventional study was carried out in the Geriatrics department of AIMS after ethical clearance by the Institutional Review Board. All the patients under the Department of Geriatrics were selected during the study period from 1st October 2014 to May 31st 2015. To assess the drug related problems, PCNE (Pharmaceutical Care Network Europe) classification for drug related problems version V6.2 were used. From the 349 geriatric patients included in the study, we have identified 410 drug related problems. These problems were categorized into potential problems (68, 16.58%) and manifest problems (342, 83.41%). In our study, we have identified effect of drug not optimal as the most common DRP (167, 40.73%), adverse drug reaction (90, 21.95%), unnecessary drug treatment (55, 13.41%), no effect of drug treatment (51, 12.43%), untreated indication (30, 7.31%), drug treatment more costly than necessary (11, 2.68%) and wrong effect of drug treatment (6, 1.46%). Effect of drug treatment not optimal was found to be significantly higher than the other problems ($p < 0.05$). For these problems, we have suggested apt and possible clinical pharmacists' intervention to the physician. These were accepted and then conveyed to the patient. Hence we were able to significantly reduce the DRPs in the Geriatrics patients ($p < 0.05$). Through our study, we have identified that clinical pharmacists' initiated interventions plays a vital role in identifying, solving and reducing DRPs among geriatrics patients. These can improve their quality of life

Keywords: Geriatrics, Drug related problems, interventions, Adverse drug reactions

INTRODUCTION

Geriatrics is the branch of subspecialty of internal medicine/general medicine concerned with the clinical, preventive, remedial and social aspects of illness in the elderly. The range of age seen under this group is 65 years or above or sometimes includes people aged 60 years and more.¹ Chronologically the geriatric population is classified into young old(65-75), old(75-85), old-old(85-95) and extreme old(>95).² As under the United Nations classification the population is divided according to age as adult persons(45-59), elder persons(60-64), old persons(65-90) and very old persons (>90).³ When we take a population of India as a whole, in it about 21% is geriatric population and it has been proposed that by the year 2050 the geriatric population would rise about 33%.⁴⁻⁶ Life expectancy is more in women than men about five years more due to genetics, biological and environmental factors.⁷ In the 20th century the main advancement was the rise in life expectancy at birth as due to this there is a need to improve the health, quality of life, discovering new treatment etc. The increasing life expectancy poses a great threat to the healthcare professionals.

Geriatric population have a lot of diseases packed together like diabetes, hypertension, dyslipidemia, heart diseases, vision and eye diseases, hearing loss, arthritis, osteoporosis, sleep disorders, Alzheimer's disease and dementia, parkinsonism, depression and lung disease. So lot of medicines are prescribed to tackle these problems. In a survey conducted in US between the year 2005 and 2006 shows that at least one prescription medications were used by 81 percent, five or more prescription medications were used by 29 percent of the overall survey population and 36 percent of population aging from 75-85 years.¹¹

Drug related problems in elderly

Drug related problems(DRPs) are an essential term in the world of pharmaceutical care. DRPs are common in elderly population which includes drug ineffectiveness, adverse drug effects, overdosage, underdosage, and drug interactions.¹² Due to certain factors such as concern about adverse effects, clinicians often underprescribe medications in elderly which may lead to ineffectiveness. Moreover poor adherence may also be due to financial constrains or cognitive impairment which can lead to ineffectiveness. Adverse drug effects are unwanted, uncomfortable, or dangerous which may be in the form of oversedation, confusion, hallucination, falls, and bleeding. There are several classifications for drug related problem, but here the classification of the Pharmaceutical Care Network Europe (PCNE) is used to clarify the concepts. A drug related problem is different from a medication error.¹²

Factors under drug related problems which are seen commonly in elderly are as follows

Polypharmacy

Polypharmacy in simple terms is the use of four or more medications by patient, generally adults aged over 65 years.¹³⁻¹⁵ Polypharmacy is a problem of prime importance not only in terms of direct medication cost but also in indirect medication cost resulting from drug related morbidity. Moreover it increases the risk of side effects and interactions. The specific number of drugs taken is not itself indication of polypharmacy as all of the drugs may be clinically necessary and appropriate for the patient, however, as the number of prescribed drugs increases, chances for polypharmacy also increases.¹⁶⁻²²

Polypharmacy is associated with suboptimal as well as inappropriate prescribing. Drugs that have an increased tendency to cause problem in older population have been labeled as inappropriate drugs for this group of population or it can be defined in simple terms as drugs that has greater potential to harm than to benefit the patient.²³⁻²⁹

Non-compliance

In medicine, compliance (adherence) describes the degree to which a patient correctly follows medical advice.³¹ Non adherence is preferred over non compliance as it implies a fault or blame on the part of the patient.

Non compliance refers to failure or refusal to comply. In medicine, the term non compliance is commonly used in regard to a patient who does not take a prescribed medication or follow a prescribed course of treatment.

Noncompliant behavior of patients often affects the effectiveness of treatment for a variety of medical conditions and can have serious consequences.³⁴

Common causes of non complaint behavior are

- Failure of communication and lack of comprehension
- Cultural issues
- Psychological issues
- Complex medication regimens
- Convenience factors(eg dosing frequency)
- Treatment of asymptomatic conditions
- Psychosocial stress
- Affordability
- Drug and alcohol dependence
- Side effect profiles of medications
- Severity of the problem
- Patient disagreeing with therapeutic plan^{32,33}

Adverse drug reaction

Adverse drug reaction (ADR) can be broadly referred as unwanted, uncomfortable, or dangerous effect that a drug may have. ADRs can be considered a form of toxicity; however toxicity is associated with effects of over ingestion or to elevated blood levels or enhanced drug effects that occur during appropriate use.

Types of ADRs are

Mostly ADRs are dose related. Dose related ADRs are usually predictable and those which are unrelated to dose are unpredictable,allergic ADRs are not dose related,it requires prior exposure and idiosyncrasy is an imprecise term used to classify unexpected ADRs that are not dose related or allergic. Treatment of ADRs include either modification of dosage or discontinuation of drug if necessary or switching to a different drug. For dose related ADRs modifying the dose or eliminating or reducing precipitating factors may be required.Prevention of ADRs is associated with familiarity with the drug and potential reactions to it. When a non specific symptom is observed,ADRs should always be considered before beginning symptomatic treatment.³⁴

Drug interaction

Drug interactions are changes in a drug's effects due to recent or concurrent use of another drug or drugs (drug-drug interaction), ingestion of food or ingestion of dietary supplements. A drug-drug interaction may increase or decrease the effect of one or either drugs . Drug interactions involve pharmacodynamic interactions and pharmacokinetic interactions.

In pharmacodynamic interactions, one drug alters the sensitivity and responsiveness of tissues to another drugs by having the same (agonistic) or a blocking (antagonistic) effect. In pharmacokinetic interactions, a drug usually alters absorption, distribution, protein binding, metabolism, or excretion.

Minimization of drug interactions:Clinicians should be aware about all of their patients current drugs.Moreover direct patient questioning about diet and alcohol consumption is recommended.³⁵

METHODOLOGY

Design of study

Prospective, interventional study

Duration of study

A study of one year was designed in which data collection was carried out for a period of 8 months

Settings

This study was conducted on outpatients and inpatients being treated at the geriatrics department of Amrita institute of Medical sciences (AIMS), Kochi, AIMS is a 1400 bedded tertiary care teaching hospital located in health sciences campus at Ponekkara in Kochi.

The Geriatrics department provides care to elderly adults above the age of 65 years, utilizing state-of-the-art technology and a world class medical team.

Study population

Study sample consisted of patients reporting in the department of Geriatrics during the study period and who satisfied the inclusion and exclusion criteria.

Inclusion Criteria

- Inpatients and outpatients under department of geriatrics

Exclusion Criteria

- Patient and/or their caregivers who are not willing to participate in the study.
- Psychiatric patients

Method of selection

Inpatients and outpatients under the department of Geriatrics during the study period who meet the inclusion and exclusion criteria were selected.

Sample Size

Sample size was calculated with a prevalence rate of 50% to get confidence level of 95% at 0.05 significance level. The minimum sample size worked out was 267. All the 349 patients who satisfied the inclusion and exclusion criteria were selected for the study.

Data collection tools

Standardized data collection (annexure no)

This was used to collect all the necessary information of the study participants required for the study

Pharmaceutical Care Network Europe-(PCNE)

PCNE is a tool for assess the drug related problems. Within this, the basic classification has 6 primary domains for problems which includes potential problem, manifest problem, drug effect, adverse reaction, treatment cost and others; 6 primary domains for causes which includes drug selection, drug form, drug use process, dose selection, logistics and patient related factors; 5 primary domains for Interventions which includes no intervention, prescriber level, patient/ carer level, drug level interventions and others and 4 primary domains for outcome of intervention which includes unknown outcome, problem solved, problem partially solved and problem not solved. The data has to be collected using "drug related problems registration form V6.2" from PCNE.

The Naranjo adverse drug reaction (ADR) probability scale.

The Naranjo criteria classify the probability that an adverse event is related to drug therapy based on a list of weighted questions, which examine factors such as the temporal association of drug administration and event occurrence, alternative causes for the event, drug levels, dose – response relationships and previous patient experience with the medication. The ADR is assigned to a probability category from the total score as follows: definite if the overall score is 9 or greater, probable for a score of 5-8, possible for 1-4 and doubtful if the score is 0. The Naranjo criteria do not take into account drug-drug interactions. Drugs are evaluated individually for causality, and points deducted if another factor may have resulted in the adverse event, thereby weakening the causal association.

Method

Out patients and in patients under the department of Geriatrics were enrolled using inclusion and exclusion criteria by taking / obtaining their consent. The well designed/ structured data collection forms were prepared and used. The study participants history was noted during direct patient interview. The Drug Related Problems were identified during direct patient interview or by reviewing the Amrita Health Information System (AHIS). To assess the drug related problems, PCNE (Pharmaceutical Care Network Europe) classification for drug related problems version V6.2 has been used. According to this, the problem was categorized, causes of the problem was analysed and appropriate clinical pharmacists' initiated intervention was provided according to PCNE. The interventions were informed to the physician. These were conveyed to the patient after physician's acceptance. The outcome of these interventions was assessed during the patient's follow up. The drug drug interactions were checked using Lexicomp Drug interaction checker. ADR was assessed using Naranjo Adverse Drug Reaction Probability Scale.

Statistical Analysis

The collected data were compiled using Microsoft Excel and were presented in the graphical format. Chi-square test was used to find significance of ratios. Chi – square was calculated using the formula

$$\text{Chi square} = \sum \frac{(O-E)^2}{E}$$

Where,

O is observed frequency

E is expected frequency

The Z test was used for comparison of proportions. It was calculated using the formula

$$Z = \frac{|p_1 - p_2|}{\sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}}}$$

$q_1 = 1 - p_1$

$q_2 = 1 - p_2$

where,

p_1 is proportion from the first population and p_2 is proportion from the second population.

RESULTS AND DISCUSSION

We have analysed a total of 747 geriatric patients through our study. Out of these 747 patients, we have identified 349 patients with DRPs. Among these 209 patients (59.88%) fall in the age group of 65-75, 129 patients (36.96%) in the age group of 75-85, 11 patients (3.15%) in the age group of 85-95. The mean of age was found to be 72.8 + 6.01. Out of the 349 patients 160 patients were males (45.84%) and 189 patients were females (54.15%).

A total of 410 DRPs were identified from these 349 patients

Classification of Problems according to PCNE

According to the PCNE , the patients were classified based on their problem, Cause for the problem, Intervention proposed to reduce the DRP and Outcome of these interventions. Out of these 68 were potential problems(16.58%) and 342 were manifest problems(83.41%).

Table 1

SL.NO	PROBLEMS	FREQUENCY (n=410)	PERCENTAGE (%)
1.	No effect of drug treatment	51	12.43
2.	Effect of drug treatment not optimal	167	40.73
3.	Untreated indication	30	7.31
4.	Adverse drug event	90	21.95
5.	Drug treatment more costly than necessary	11	2.68
6.	Unnecessary drug treatment	55	13.41
7.	Wrong effect of drug treatment	6	1.46

Classification of causes According to PCNE

Once the problem was detected, we have analyzed the cause for the problem. We have identified a total of 410 causes for the above mention problems

Table 2

SL.NO	CAUSE	FREQUENCY (n=410)	PERCENTAGE (%)
1.	Inappropriate drug	71	17.31
2.	No indication for drug	14	3.41
3.	Inappropriate combination	68	16.58
3.	Inappropriate duplication	17	4.14
4.	Unnoticed indication	30	7.31
5.	Too many drugs for indication	24	5.85
6.	Drug dose too low	6	1.46
7.	Drug dose too high	12	2.92
8.	Patient gets/takes drug on wrong times	37	9.02
9.	Drug not taken/ administered	62	15.12
10.	Patient unable to use drug or form as directed	20	4.87
11.	Patient forgets to take drug	49	11.95

The major problem identified was effect of drug not optimal(167 , 40.7%). The various causes for this were drug-drug interaction(62 , 37.12%), patients forgetting to take the drug(49 , 29.34%),unaware of the right instructions to use MDI and insulin injections(20 , 12%) ,drug dose too low(6 , 3.5%). In a study conducted by **Waseemudin MD and Reddy PS**, a total of 150 geriatric patients was included, the commonly observed DRP were drug interactions(62).The second major problem identified in our study was Adverse Drug Reactions(90 , 22%). The causes for ADR identified were inappropriate drug being prescribed(41 , 45.55%) increased doses(12 , 13.33%) patient taking drug at wrong times (37 , 41.11%).In a study conducted by **Gillespie U** have identified 476 DRPs , of which the most common was adverse drug reactions(119), commonly caused by a dose that was too high.

The third major drug related problem identified was unnecessary drug treatment (55 , 13.4%). The various causes for this problem were too many drugs for an indication(24 , 43.6%),inappropriate duplication(17 , 31%),no indication for the drug (14 , 25.4%).Another drug related problem that we have

identified in our study was no effect of drug treatment(51 , 12.4%). This was because the patient was not administered the drug at all.

The next major drug related problem in our study was untreated indication (30 , 7.3%). Here the patient has not been prescribed a drug for the medical condition. In a study conducted by **Ahmad A et al** , 992 potential DRPs were observed in 340 geriatric patients. The most commonly observed DRPs for these patients were no drug prescribed but clear indication (139 , 16.1%). Another drug related problem identified through our study was drug treatment more costly than necessary(11 , 2.6%). Here the cause was more cost effective drug available. Wrong effect of drug treatment was also identified as a problem in our study(6 , 1.46%). This was mainly because of inappropriate combination of drugs given. By applying Chi Square test, Effect of drug treatment not optimal was found to be significantly higher than the other problems($p < 0.05$).

Classification of Intervention According to PCNE

According to PCNE , a single problem can have upto 3 interventions and accordingly we have done a total of 536 interventions in our study.

Table 3

SL.NO	INTERVENTION	FREQUENCY (n=536)	PERCENTAGE (%)
1.	Patient counseling	150	27.98
2.	Drug changed	53	9.88
3.	Instructions for use changed	99	18.47
4.	Drug stopped	55	10.26
5.	New drug started	65	6.52
6.	Spoken to family member/care giver	96	17.91
7.	Dosage changed	18	3.35

Patient counselling (150 , 27.98%) was done as an intervention for the following DRPs are Lack of knowledge of medications(51 , 34%), Patient forgets to take medication(49 , 32.66%), Patient unable to use the drug as instructed-MDI, Insulin (20 , 13.33%), Inappropriate drug(30 , 20%). Instructions for Use Changed (53 , 9.88%) was the intervention for the following DRPs ADR due to patient taking drug at wrong times(37 , 37.37%), Drug- Drug interactions(62 , 62.62%). The various problems for which drug has been stopped (55 , 10.26%) are therapeutic duplication(17 , 30.90%) , no indication for drug(14 , 25.45%) , too many drugs for indication(24 , 54.54%).

The various problems for which drug has been stopped (55 , 10.26%) are therapeutic duplication(17 , 30.90%) , No indication for drug(14 , 25.45%). Too many drugs for indication(24 , 54.54%) We have started a new drug(65 , 6.52%) for the following DRPs no drug for indication(30 , 85.71%) , ADR(5 , 14.28%).

Another intervention that we have done was speaking to family members/ care givers(96 , 17.91%). The various problems for which it was done were Lack of knowledge of medications(27 , 28.12%) Patient forgets to take medication (49 , 51.04%) Patient unable to use the drug as instructed-MDI, insulin (20 , 20.83%) The various DRPs for which dosage has been changed(18 , 3.35) are ADR (12 , 66.66%) , Drug dose too low(6 , 33.33%)

Classification of Outcomes According to PCNE

Out of the 349 patients that we have identified to have DRPs, a total of 205 patients came for follow up during our study period. Out of the 410 DRPs identified, we were able to analyze the outcomes of clinical pharmacists' initiated intervention for 217 DRPs.

Table 4

SL.NO	OUTCOME	FREQUENCY (n=410)	PERCENTAGE (%)
1.	Outcome intervention unknown	193	47.07
2.	Problem totally solved	192	46.82
3.	Problem partially solved	21	5.12
4.	Problem not solved	4	0.975

By the above mentioned Clinical Pharmacists’ initiated interventions, we were able to fully solve effect of drug treatment not optimal by 33.53% , adverse Drug Reactions by 46.66% , Unnecessary drug treatment by 61.81% , No effect of drug treatment by 64.71%. Untreated indication by 53.33% Drug treatment more costly than necessary by 36.36%,Wrong indication of drug treatment by 100%

205 patients came for follow up. These patients initially had a total of 217 DRPs. After our intervention, we have found that the problem was completely solved for 192 DRPs. By applying Z test we have found that we were able to significantly reduce the number of DRPs with clinical pharmacists’ initiated interventions(p<0.05, confidence level=95%).

Table 5

SL.NO	Patients	DRPs
1	Before giving intervention	217
2	After giving intervention	25

CONCLUSION

Clinical Pharmacists plays a vital role in identifying, solving and thereby reducing DRPs among geriatrics patients. Through our study, we have found that by clinical pharmacists’ initiated interventions,that were approved by the physician, we could significantly reduce the DRPs among these patients.We have also improved knowledge of medications among geriatrics patients by providing appropriate patient counselling. By all these measures, we were able to improve their quality of life.

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